Notes on Cephalopods from Northern California

BY

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In 1912 S. Stillman Berry published a paper on the cephalopods of western North America, a painstaking and comprehensive study, long out of print, but still the only accurate account available today, covering this interesting class of mollusks in the designated area. Robson's (1929-1931) two part monographic work was limited to the Octopoda, and Pickford (1964) presented a detailed study of a single polymorphic species of octopod. There have been a number of taxonomic and distributional notes published, but as far as I could learn, there has been no detailed study covering any one portion of the California coast.

The following brief notes are presented not as a taxonomic discussion, but rather to bring together new and additional information on the basic ecology, distribution and, to some extent, the physical characteristics of several cephalopods found in two degrees of Latitude on the extreme northern coast of California (Lat. 39° 30′N to 41° 30′N). All of the data are based upon specimens deposited in the collection of the California Academy of Sciences or in my own collection. The specimens for the most part were obtained by the commercial dragboat fleet operating out of Humboldt Bay, California.

At this time I wish to express my appreciation to the men who have so willingly brought me the specimens for many of the present records. I also wish to express my appreciation to the staff of the California Academy of Sciences for assistance given me while I was at the Academy and for the permission granted to include data from the Academy Collection.

COMMERCIAL FISHERIES

There are no commercial fisheries as such for either squid or octopus on Humboldt Bay. I have noted squid, *Loligo opalescens* Berry, in one of the local fish markets, but learned that these had been shipped from Monterey, California. Squid used for bait by the crab fishermen is brought from Monterey and recently also from Japan. A few octopus are brought ashore by the fishermen for display in a local commercial aquarium, for specimens, or as an epicurean item. Although a few squids have been caught off this coast, the numbers are small and not sufficient to support a bait fishery.

DAMAGED and DISTORTED SPECIMENS

The often torn or mangled condition of many benthic cephalopods may be easily understood if a person observes the operation of capture. All cephalopods have soft bodies, but many of the benthic species have a body so soft that the tissues are gelatin-like in texture. This is possibly useful to the animal as it moves voluntarily from layer to layer in the depths. It would allow the pressure to equalize both within and without the animal tissues. However, when the cephalopod is caught in the fishing net, mixed in with perhaps several tons of fish, and then rapidly brought to the surface, it is difficult or probably impossible for the animal to equalize the internal pressure, and a nearly explosive decompression occurs in the cephalopods as it does in the fish brought from the same depths. The ultra-soft tissues then are torn easily by the net, by projections on deck, or among the fishes themselves.

Distortion occurs from such pressure release as well as from several other factors. In order to keep this distortion to a minimum, special jars of preservatives were placed on a number of the Otter Trawlers so that all of the specimens would be field-preserved in a similar preserving medium. This was also necessary in order to harden the gelatin-like tissue of the deeper benthic species so that they would be available for later study.

COLORATION

Reference to the coloration of cephalopods is, at best, rather uncertain. The species not only are able to change color at will, but vary considerably from life to death, and from death to a preserved state. The preservatives themselves may affect coloration, alcohol acting as a bleaching agent, to name one example. Therefore, the preservatives furnished to the vessels actually were a mixture, and every effort was made to secure any specimens brought in within a week in order to obtain a better understanding of the coloration. In addition, comparison

with living animals was made whenever possible. One important factor was noted: in life the animals are translucent or nearly transparent, with the colored chromatophores standing out in a starkly contrasting manner; at death this translucent body became opaque and when preserved turned a dead white. In some species the rusty browns became darker and in others lighter. But most very old specimens examined were a dead opaque white.

SPECIES

At the present time there are 10 species of cephalopods in the collections of the California Academy of Sciences and in the Talmadge Collection which were obtained from off this region in northern California. Since many species are pelagic, it is quite possible that additional species will be found in time. The following is a list of the species represented in the collections mentioned.

Octopus dofleini martini Pickford, 1964

I use this taxon, but the species is also known as *Octopus punctatus* Gabb, 1862; *O. hongkongensis* auct., *non* Hoyle, 1885; *O. apollyon* auct., *et* (Berry, s. l.), *non* (Berry, s. s.), 1912. As Pickford has probably worked with more specimens of this, the largest known species, than any other worker, I follow her diagnosis. Berry (1912) was perhaps the first worker to hint at an eastern : western Pacific separation and proposed the name *O. appolyon* for the western Pacific population, but restricted the type to an Alaskan specimen. Pickford agreed with Berry and designated *O. dofleini apollyon* Berry as the Alaskan subspecies. It is evident that Berry realized the situation, but lacked sufficient material to complete his diagnosis.

In northern California the species is found from the deep intertidal down to around 40 fathoms, usually in a hard mud or rocky substratum. This is one of the "hard" bodied species and sets firmly in preservatives. In life the species is usually tan or grey, darker on the dorsum, and when placed in preservatives will often turn to a purplish brown. Although it is reported to attain great size, (Berry, 1912, quoting Dall as stating that the species will reach a spread of 28 feet at Sitka) I have never seen one that would exceed 18 feet when spread on a dock.

Octopus californicus (Berry, 1911)

The "*Anna W*", one of the larger dragboats on Humboldt Bay, has brought me several specimens taken north of Eureka in less than 100 fathoms on a sandy bottom. The captain noted that the coarse nodes present on preserved specimens were not noticeable in life, but became quite apparent when the animal was placed in preservatives. The coloration is a dark rich reddish brown, and becomes somewhat lighter in preservatives. Both sexes of this small species were present, and the hectocotylized tip of the third right arm of the male appeared to be detached in several specimens. A closer examination revealed that where the missing tip had been, a minute growth was forming, probably a regeneration of the male portion of the arm.

Octopus leioderma (Berry, 1911)

This is a small, smooth, "soft" octopus usually taken on a muddy sand substratum in about 50 fathoms of water. Usually the animals are considerably distorted and damaged, as they are found in the narrow crevices of the deck grates and about the scuppers. There is a definite constriction between the body and the head, the head and the arms, and another, less pronounced ridge or rim on the horizontal plane of the body, which resembles a mold-mark on a plastic toy. In coloration the animal is a pinkish-tan, livid, and when placed in preservatives it darkens to a brownish-red, lighter on the ventral surface. Both males and females were obtained from the "*Winga*" and the "*Anna W*".

Opisthoteuthis californicus Berry, 1949

The type locality for this interesting and non-octopod appearing species is off Humboldt Bay and the majority of the known specimens has been obtained from off this portion of the California coast. The species may attain over 2 feet in diameter, and in life looks like a translucent jelly-fish veined with rust on the dorsal surface; ventrally the animal is entirely rust color. The minute fins on the dorsal surface are puzzling structures. The body is extremely soft and the name the fishermen use, "jelly-fish-octopus," seems to me to be more appropriate than the official name "flapjack devilfish." Most of the specimens were taken in excess of 300 fathoms, but it is known to occur at times in depths of only about 100 fathoms. All material in my collection came from a very soft mud substratum and was obtained for me by the "*Ina*," "*Flicker*" and "*Anna W*".

Loligo opalescens Berry, 1911

A few specimens taken off Redding Rock, north of Eureka, have reached me through the "*Anna W*," fishing in about 100 fathoms. None of the specimens exceeded 200 mm in length; they were taken singly, not in a school of squid. In life the animal is truly opalescent, a pinkish-tan, translucent, with the chromatophores standing out in stark contrast. In death the body is opaque and when placed in preservatives, the body turns white with the red chromatophores turning dull brown.

Meleagroteuthis hoylei Pᴜffer, 1900

A single, slightly mangled specimen (a female), 118 mm in length, including the arms but not the tentacles, was caught in the net of the "*Flicker*" in a depth of over 300 fathoms. This species is well figured by Berry, 1912, who records it from Monterey, California. There are 2 very small specimens, bleached white, in the collection of the California Academy of Sciences; they were taken on the Cordell Bank, Marin County, California. The recent specimen was a dark purple in life with small tan, grain-like nodules on the dorsal surface, especially on the body, and until the specimen was placed into preservative, these grain-like markings were actually extruded and could be felt with the fingers of one's hand. In preservative, the color has changed to a rich purple with tiny tan grain-like markings on the body, but the small nodes now no longer may be noted.

Galiteuthis pyllura Berry, 1911

The dragboat "*Ina*" obtained the rather diagnostic "leaf" tail of a specimen of this species amid the debris left on deck after a drag. The captain and crew noting that this was animal tissue new to them, saved the bit of flesh by freezing it in their refrigerator. In life or when found, the tissue was nearly translucent with dark reddish maculations, which in freezing turned an opaque dead white with dark red markings. Based upon Berry's measurements of the type specimen, the Humboldt specimen must have been 350 mm long, much larger than Berry (1912) recorded. There are some specimens, again bleached, from the Cordell Bank, in the collection of the California Academy of Sciences.

Moroteuthis robusta (Verrill, 1876)

The giant squid, which is reputed to attain a length of 50 feet, has been taken by dragboats off Eureka, California. For obvious reasons, only a major research center has the necessary facilities to store preserved specimens. I have seen no fresh or living examples, but have examined some on docks at various times; I also have examined the preserved specimens in the California Academy of Sciences. The dragboat fishermen have no love for these creatures as their size makes them difficult to handle and they often damage the nets. In coloration the preserved specimens remind me of a dark *Loligo opalescens*.

Rossia pacifica Berry, 1911

"Short-bodied squid" is the vernacular name for this small, ultra-soft-bodied cuttlefish. It is usually taken in about 100 fathoms, on a sandy mud to mud bottom; it is translucent grey on the dorsal surface and greyish white on the ventral surface. It is badly mangled when mixed in with fish. It is perhaps more common than noted as the small size and very soft body allow this animal to wash between the deck grates and out the scuppers without being seen.

Gonatopsis sp.

There are 2 specimens of this eight armed squid in the collection of the California Academy of Sciences, taken by the "*City of Eureka*" in 200 fathoms of water off Eureka. To some extent these preserved animals resemble the giant squid, but they are much smaller; the 2 body fins are quite strong and the coloration is the same brownish with dark brown maculations.

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